REMARKS

This application contains claims 1-40 and 43-62. Claims 1-40 and 43-52 have been withdrawn in response to a restriction requirement. Claim 56 has been canceled without prejudice. Claims 53, 54 and 58 are hereby amended. No new matter has been introduced. Reconsideration is respectfully requested.

Claims 58-62 were rejected under 35 U.S.C. 112, first paragraph, for alleged failure to comply with the written description requirement with respect to the "state machine model" recited in the claims. Applicant respectfully traverses this rejection.

The specification of the present patent application describes at length and in detail the use of Hidden Markov Models (HMMs) in analyzing sleep stages. It is well known in the art that a HMM is a statistical type of state machine model, and in fact, claim 61 specifically identifies the state machine model as a HMM. Fig. 18 and the corresponding text in paragraphs 0272-0273 (referring to the published version of this application, US 2004/0073098) explain in detail how HMMs may be used in classifying sleep stages based on transitions among states of the HMM. Paragraph 272 describes how the machine states of the HMM correspond to physiological states (sleep stages) and how the probabilities of transitions between the states are derived from EEG data. Thus, claims 58-62 are believed to meet all the requirements of 35 U.S.C. 112.

The Examiner indicated in the Official Action that claims 58-62 recite subject matter that is allowable over the prior art. Applicant has amended claim 58 to stand as an independent claim, incorporating the limitations of claim 53, from which it formerly depended. Claims 58-62 are therefore believed to be in condition for allowance.

Claims 53, 55 and 56 were rejected under 35 U.S.C. 102(b) over Pichlmayr (U.S. Patent 5,846,208). Applicant has amended independent claim 53 to clarify the distinction of the claimed invention over Pichlmayr. The amended claim incorporates the limitations of claim 56 (now canceled), as well as additional clarifying language based on the specification (paragraphs 0306-0307). Claim 54 has been amended for proper dependence in view of the amendment to claim 53.

Pichlmayr describes a method for evaluation of EEG data that uses feature vectors in training a neural network (abstract). The feature vector includes components given by the signal power in predetermined frequency bands and a “suppression parameter component” (col. 7, lines 1-7). Each feature vector is subjected to a cluster analysis and is thus assigned to one of N neurons in the neural network (col. 7, lines 40-48).

The apparatus recited in claim 53, as amended, takes this sort of analysis a step further in two key directions: First, in order to form clusters, a biomedical signal is adaptively segmented into a sequence of quasi-stationary segments. This sort of adaptive segmentation gives a more reliable basis for analysis of biomedical signals, including EEG signals, as explained in the specification (paragraphs 0173-0177, for example). By contrast, Pichlmayr simply uses fixed evaluation intervals (col. 7, lines 2-3).

Moreover, unlike Pichlmayr, the apparatus of claim 53 does not merely assign each time interval to a cluster, but rather assigns a set of membership values to each interval. Each membership value in the set gives the degree of association between the given interval and one of the clusters. Fig. 37 in the present patent application, for example, shows three clusters (3704, 3705 and 3706) for which respective membership values will be computed. This use of graded membership values (as explained in paragraph 0307) permits the ambiguous and probabilistic nature of the biomedical signals to be taken into account in the analysis.

Thus, claim 53, as amended, is believed to be patentable over Pichlmayr. In view of the patentability of claim 53, claim 55 is also believed to be patentable.

Claims 54 and 57 were rejected under 35 U.S.C. 103(a) over Pichlmayr in view of Moore-Ede (U.S. Patent 6,511,424). In view of the patentability of amended independent claim 53, dependent claims 54 and 57 are also believed to be patentable. Moore-Ede, like Pichlmayr, describes a method for evaluation of sleep events and stages based on neural networks (abstract), but he does not teach or suggest the added features of claim 53 that are explained above.

Applicant has studied the additional references made of record by the Examiner and believes the claims in this application to be patentable over these references, as well, whether the references are taken individually or in any combination.

Applicant believes the amendments and remarks presented above to be fully responsive to all of the grounds of rejection raised by the Examiner. In view of these amendments and remarks, all of the claims in the present application are believed to be in condition for allowance. Prompt notice to this effect is requested.

Respectfully submitted,

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